Unit 15.5
Graphing Functions
Day 1
Graphing Polynomial Functions

To analyze the graph of a polynomial function y=f(x), follow the following steps:

1) (a) Find the x-intercepts, if any, by solving the equations f(x)=0.
   (b) Find the y-intercept by finding f(0).
2) Use multiplicity to determine whether the graph of f crosses or touches the x-axis at each x-intercept.
3) Determine end behavior.
4) Determine the max number of turning points (degree minus 1)
5) Use the intercept(s) to find the intervals on which the graph of f is above or below the x-axis.
6) Plot the points obtained in steps 1 and 5, and use the remaining information to connect them with a smooth, continuous curve.

Ex1: $f(x)=x^3-7x-6$

$f(x)=(x+2)(x-3)(x+1)$

a) $x=\{-2,3,-1\}$ x-ints

b) $f(0)=-6$

2) all cross

3) ↑ ↓

4) 2

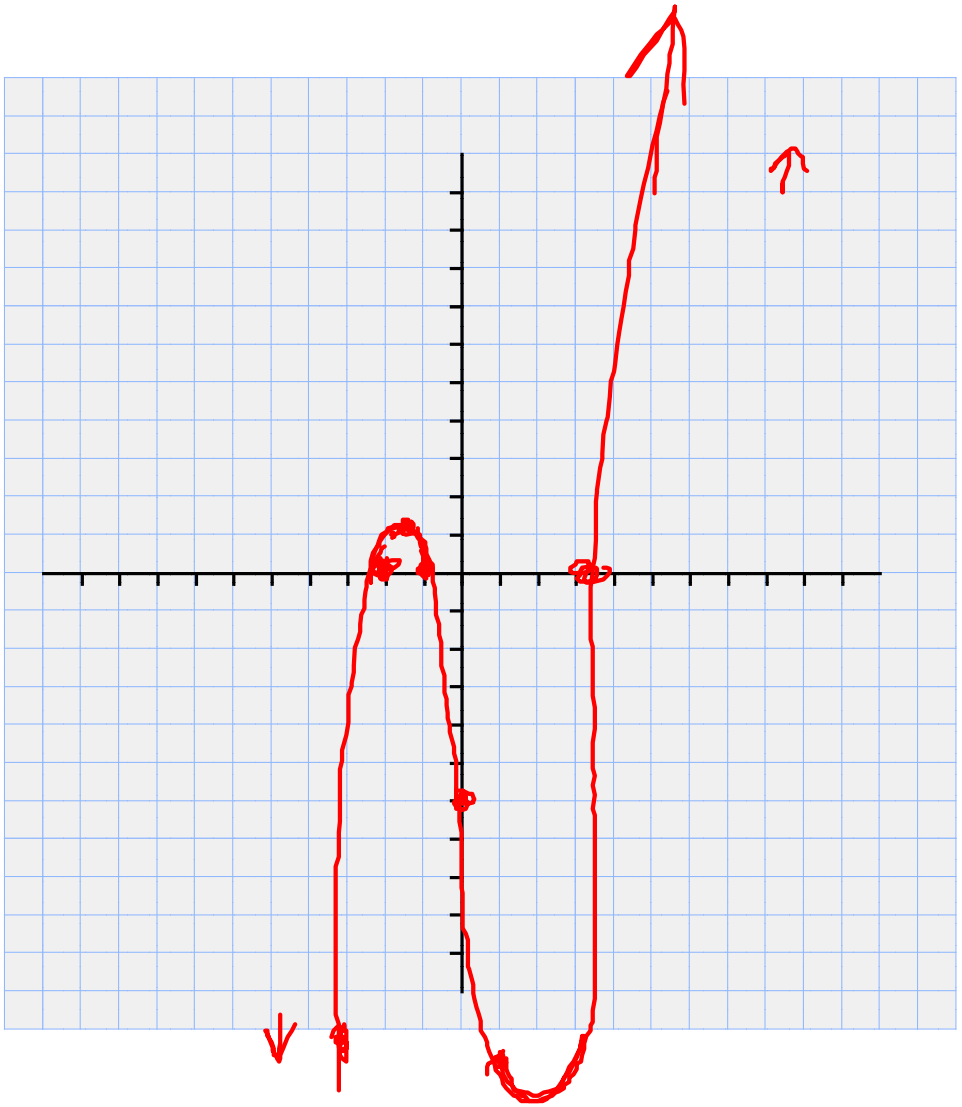
$f(-3)=(-3)^3-7(-3)-6=-12$

$f(-\frac{3}{2})=(-\frac{3}{2})^3-7(-\frac{3}{2})-6=\frac{9}{8}$

$f(1)=(1)^3-7(1)-6=-12$

$f(4)=64-28-6=30$

note - solution behind graph



END BEHAVIOR

ODD DEGREE

LEADING TERM POSITIVE

behave like $y = x^3$

L R

LEADING TERM NEGATIVE

behave like $y = -x^3$

L R

EVEN DEGREE

LEADING TERM POSITIVE

behave like $y = x^2$

L R

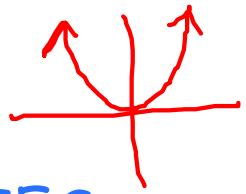
LEADING TERM NEGATIVE

behave like $y = -x^2$

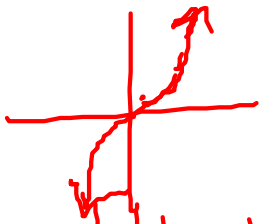
L R

Determining the behavior of the intercepts

EVEN MULTIPLICIES - touch like $y = x^2$

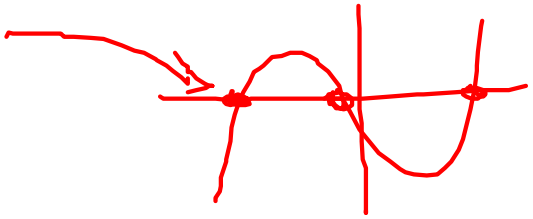


ODD MULTIPLICITIES over 1 - flex like $y = x^3$



No Multiplicity → crosses

1



Ex2: $y=(x+2)^2(x-1)(x+3)$

touch

1) a) -2 (mult 2), $1, -3$

b) ~~12~~ $f(0)=-12$

~~3~~ 4) 3

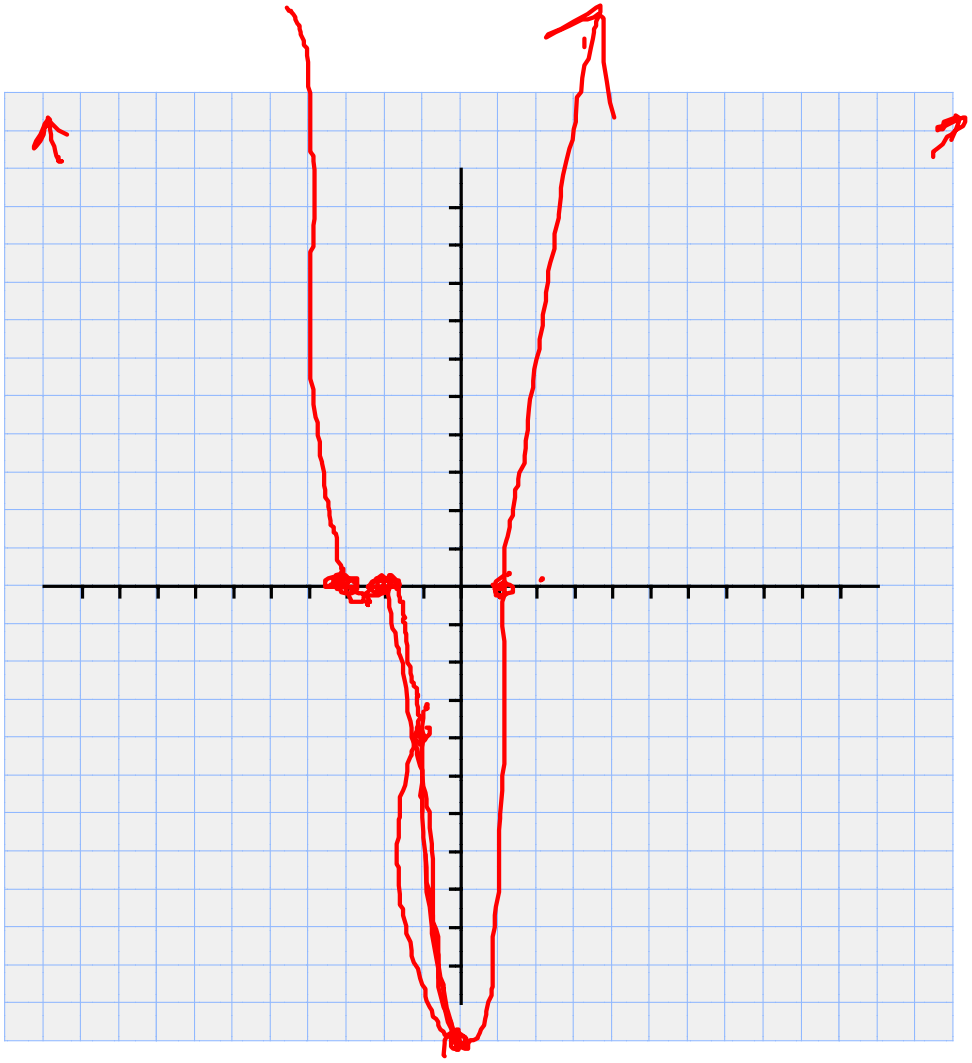
$f(-4)=20$

$f(-\frac{5}{2})=-.4375$

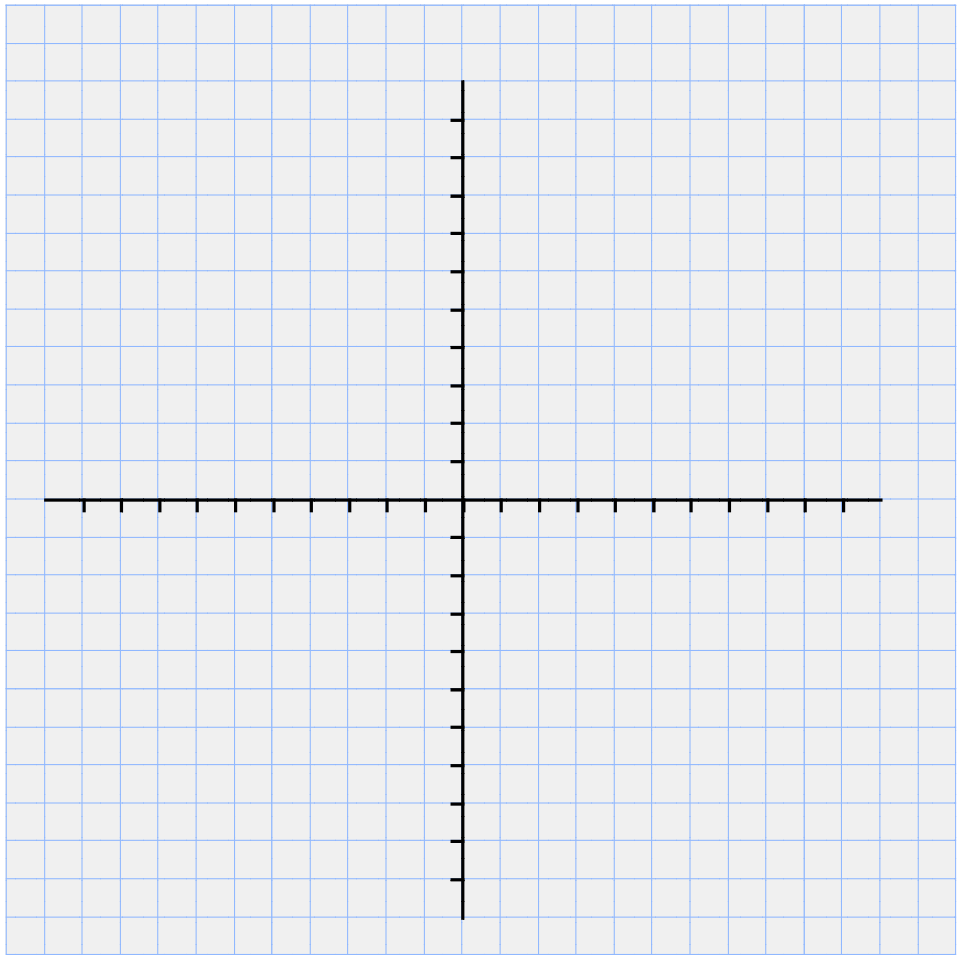
$f(-1)=-4$

$f(\frac{1}{2})=-10\frac{15}{16}$

$f(2)=80$



Ex3: $f(x)= -(x^2-5)(2x-3)(x+1)^3$



Homework:

Unit 15.5
Day 1

p. 311-2: 1-8 (all), 22-28 (even)